

FIG.1

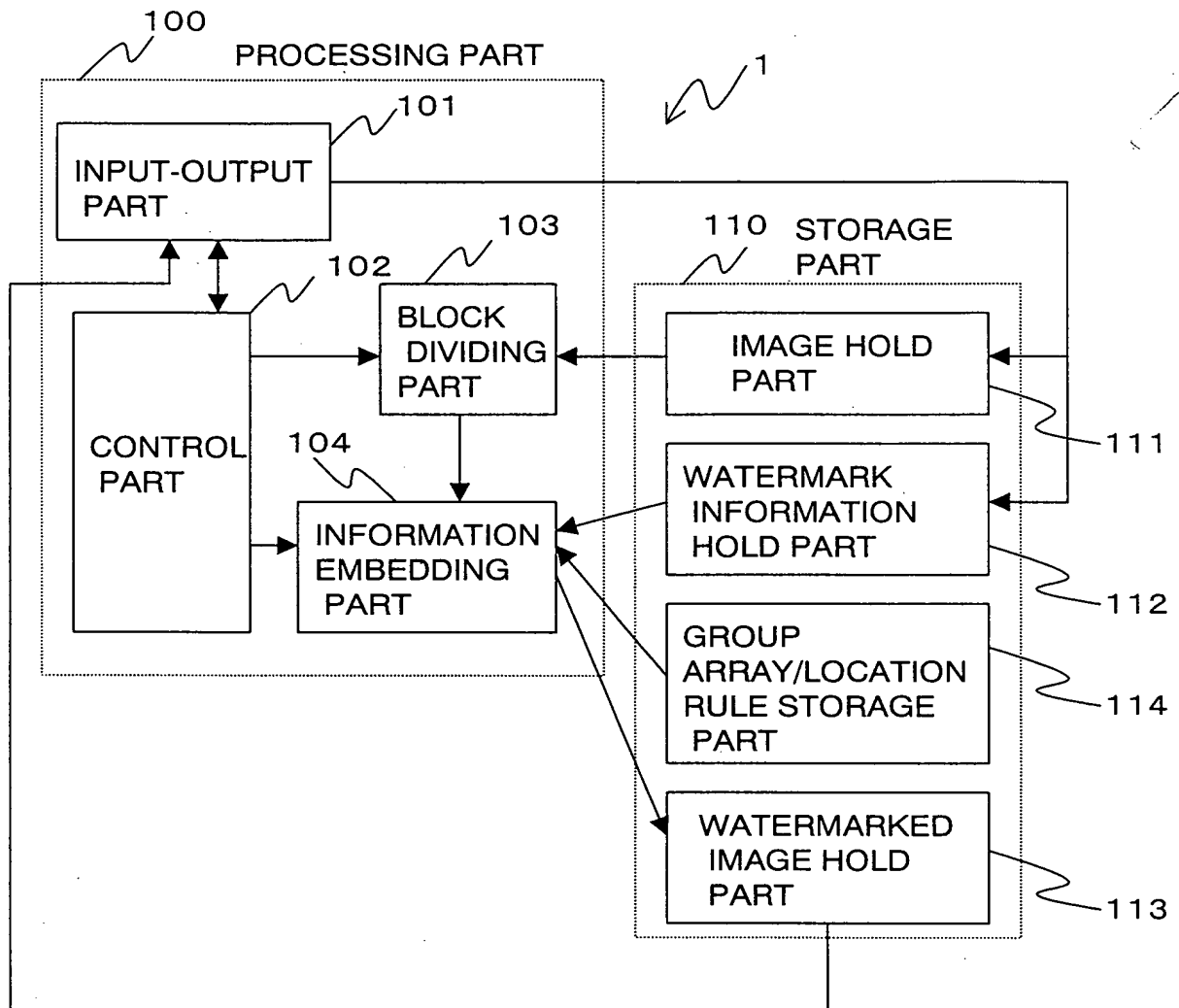


FIG.2

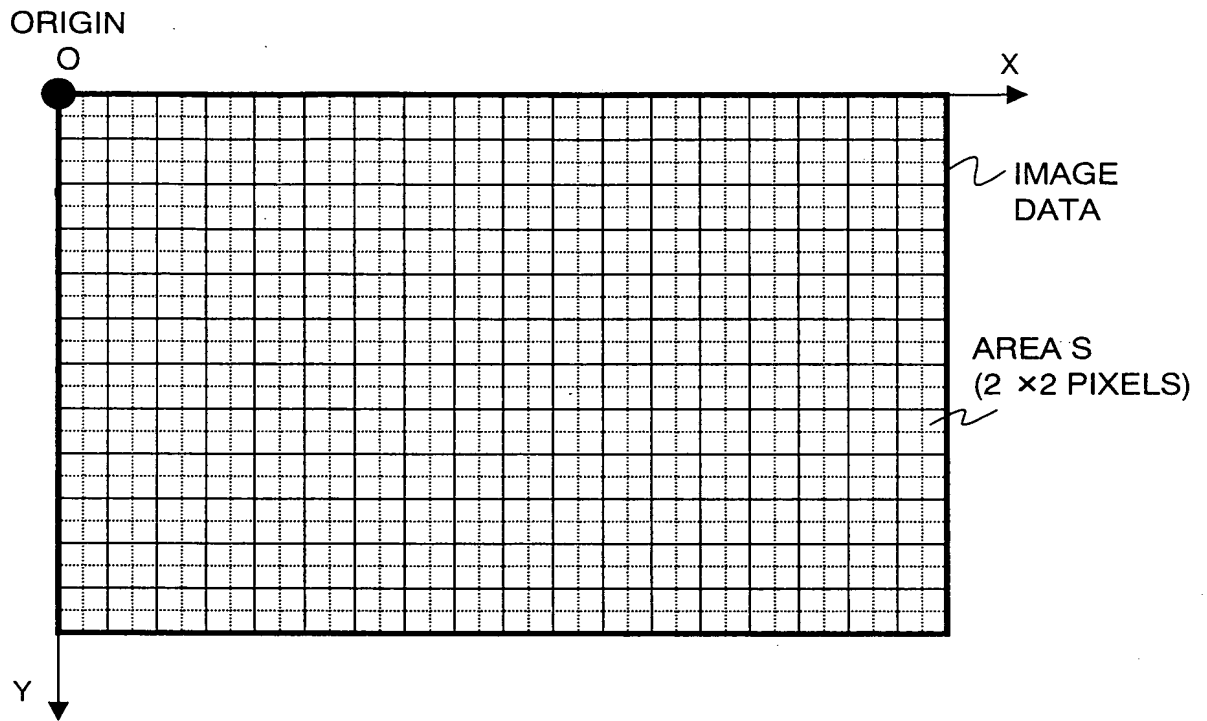


FIG.3

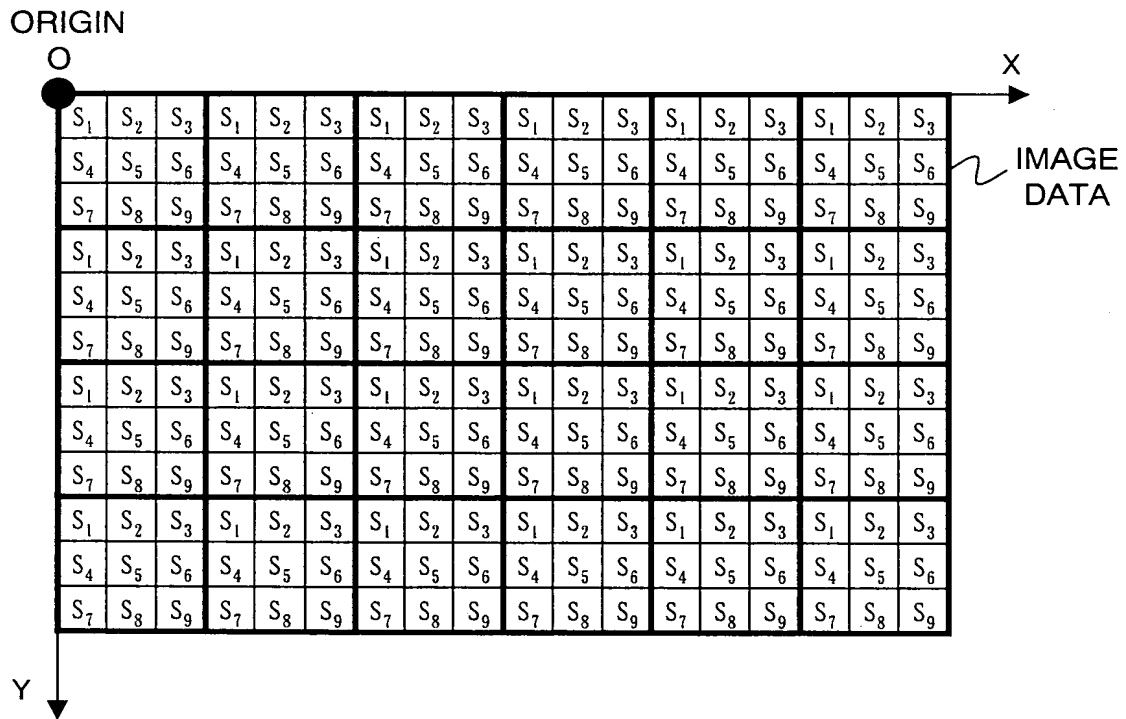


FIG.4

FIRST PATTERN

S_1 ↑	S_2 ↑	S_3 ↑
S_4 ↑	S_5 ↑	S_6 ↑
S_7 ↑	S_8 ↑	S_9 ↑

GROUP G

SECOND PATTERN

S_1 ↑	S_2 ↓	S_3 ↑
S_4 ↓	S_5 ↑	S_6 ↓
S_7 ↑	S_8 ↓	S_9 ↑

GROUP G

↑ FOR A BIT 1, BRIGHTNESS IS INCREASED.
 ↓ FOR A BIT 0, BRIGHTNESS IS DECREASED

↓ FOR A BIT 1, BRIGHTNESS IS DECREASED.
 ↑ FOR A BIT 0, BRIGHTNESS IS INCREASED.

FIG.5

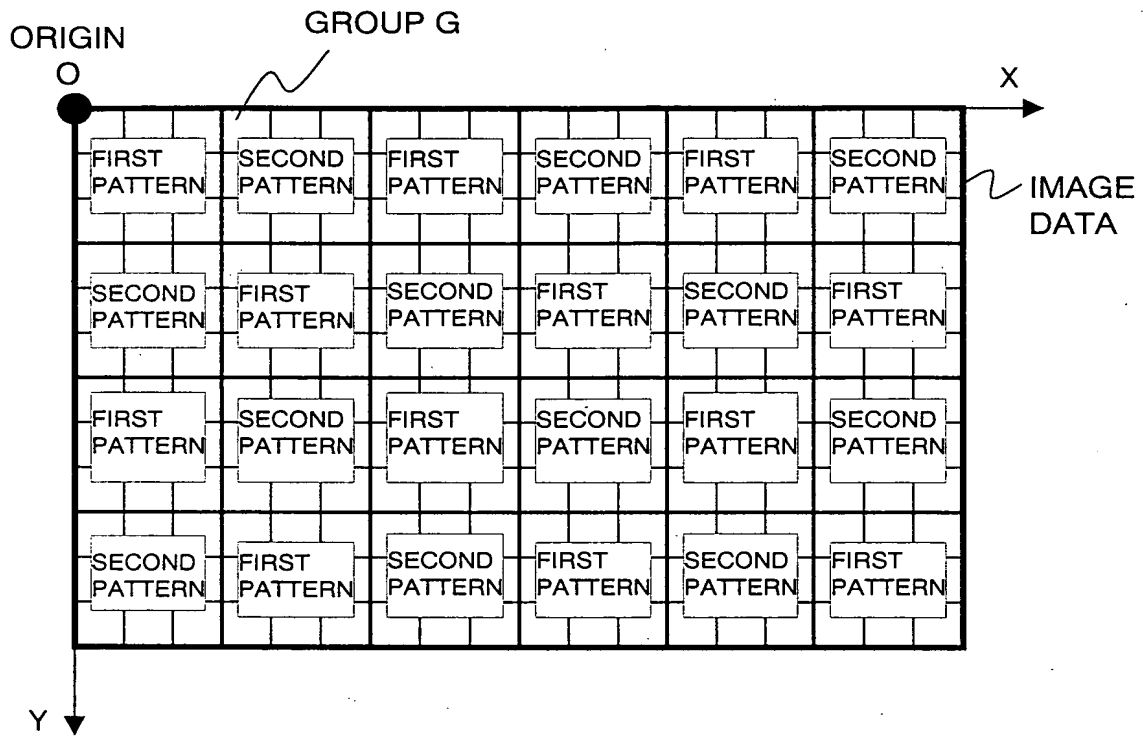


FIG.6

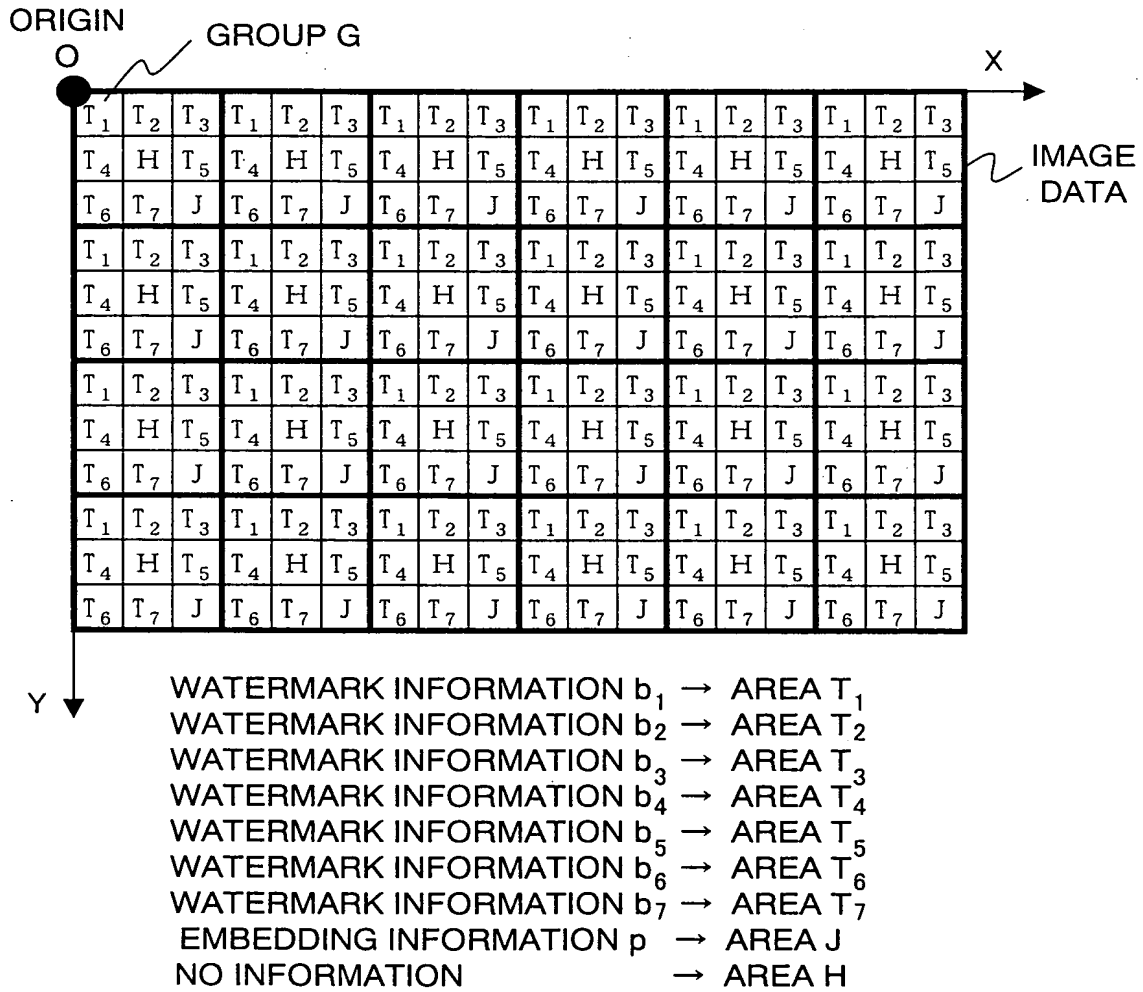


FIG.7

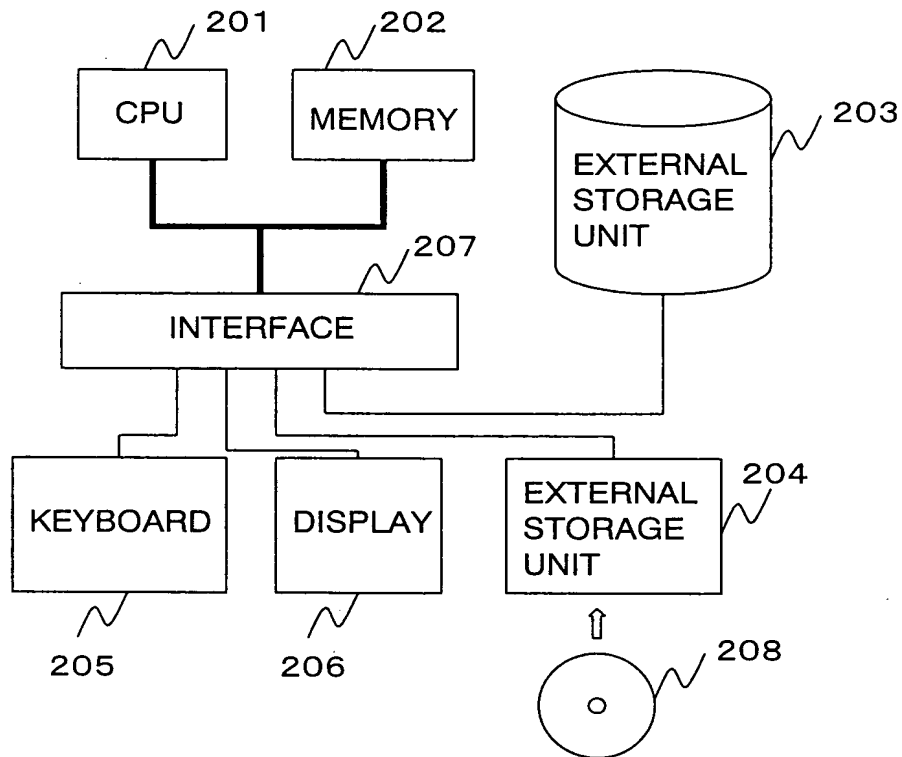


FIG.8

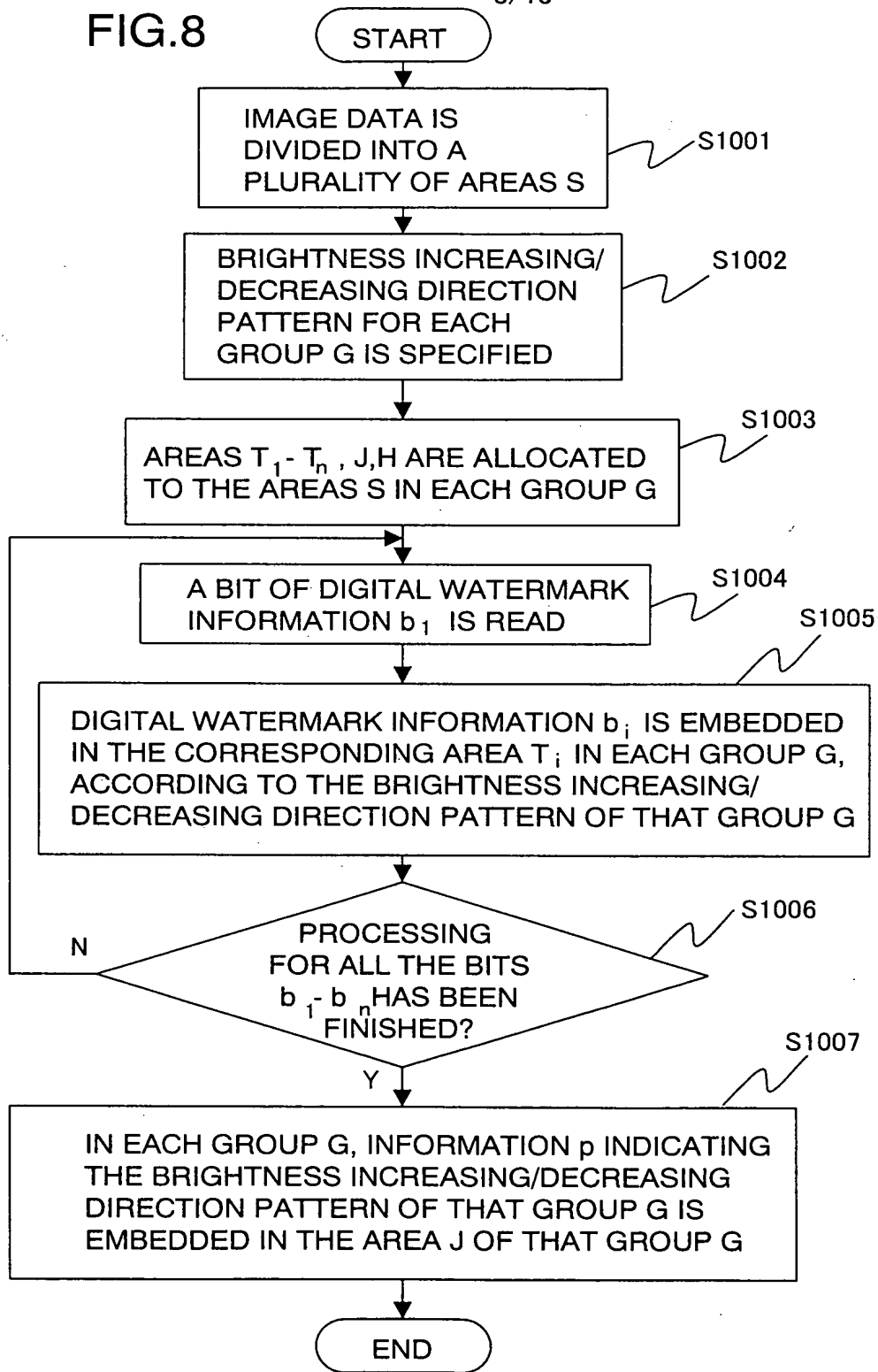


FIG.9

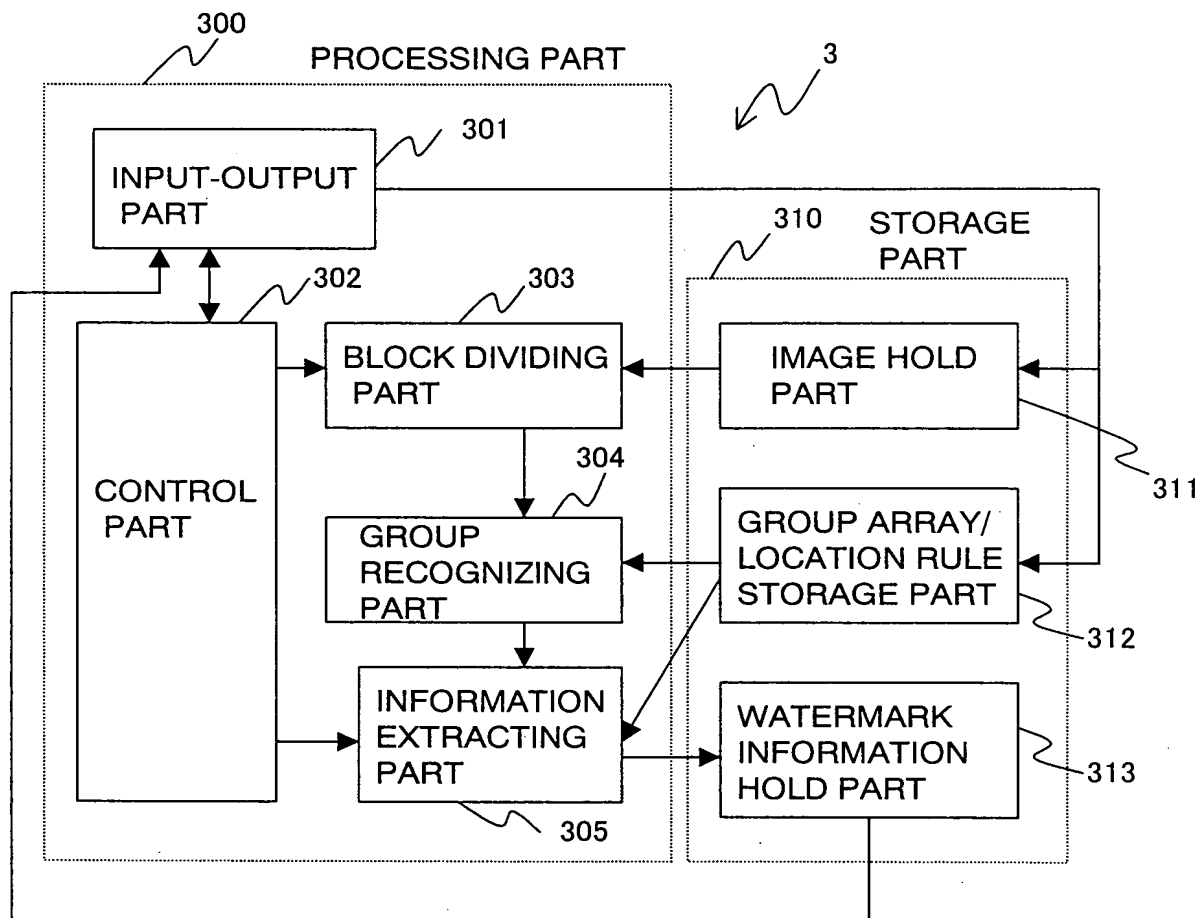
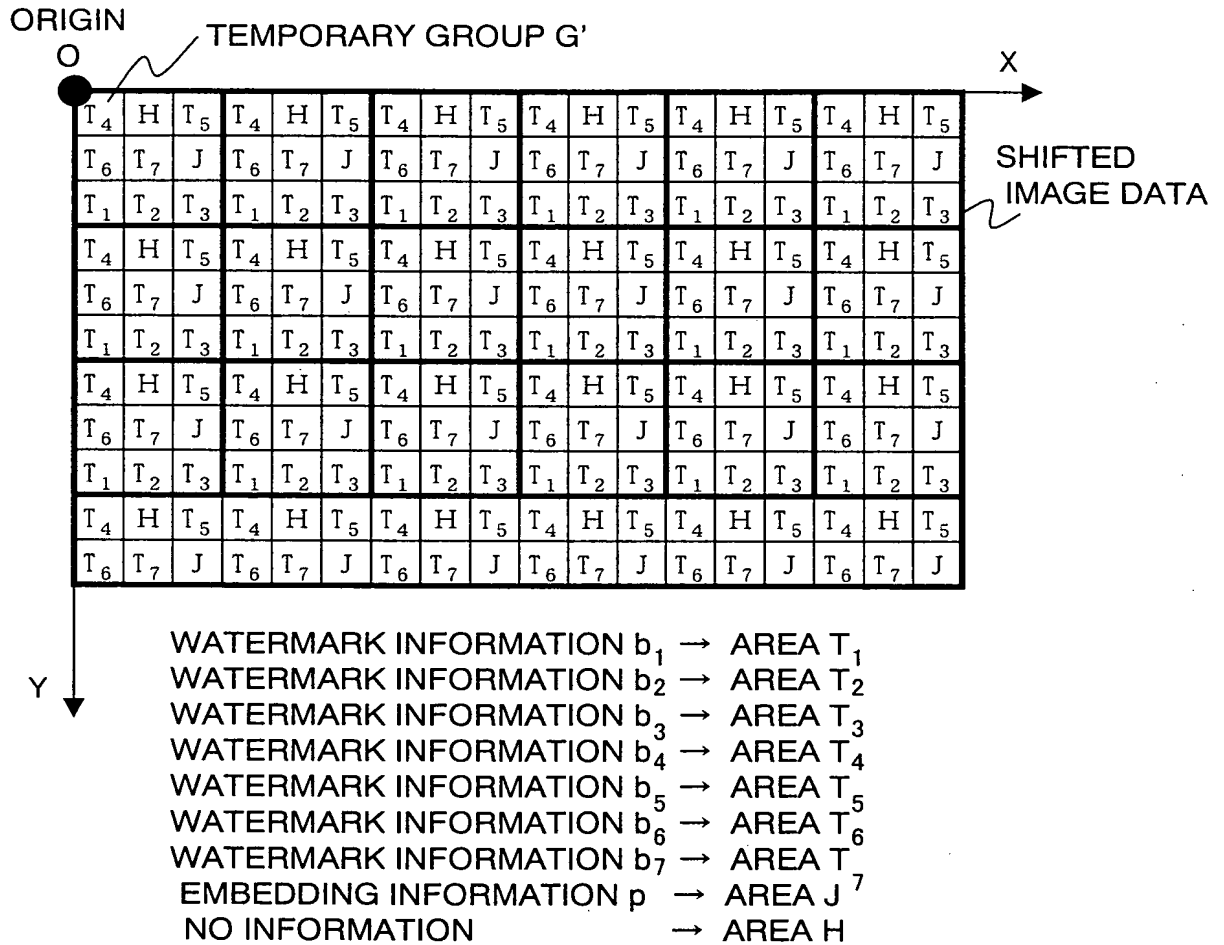


FIG.10



ORIGIN

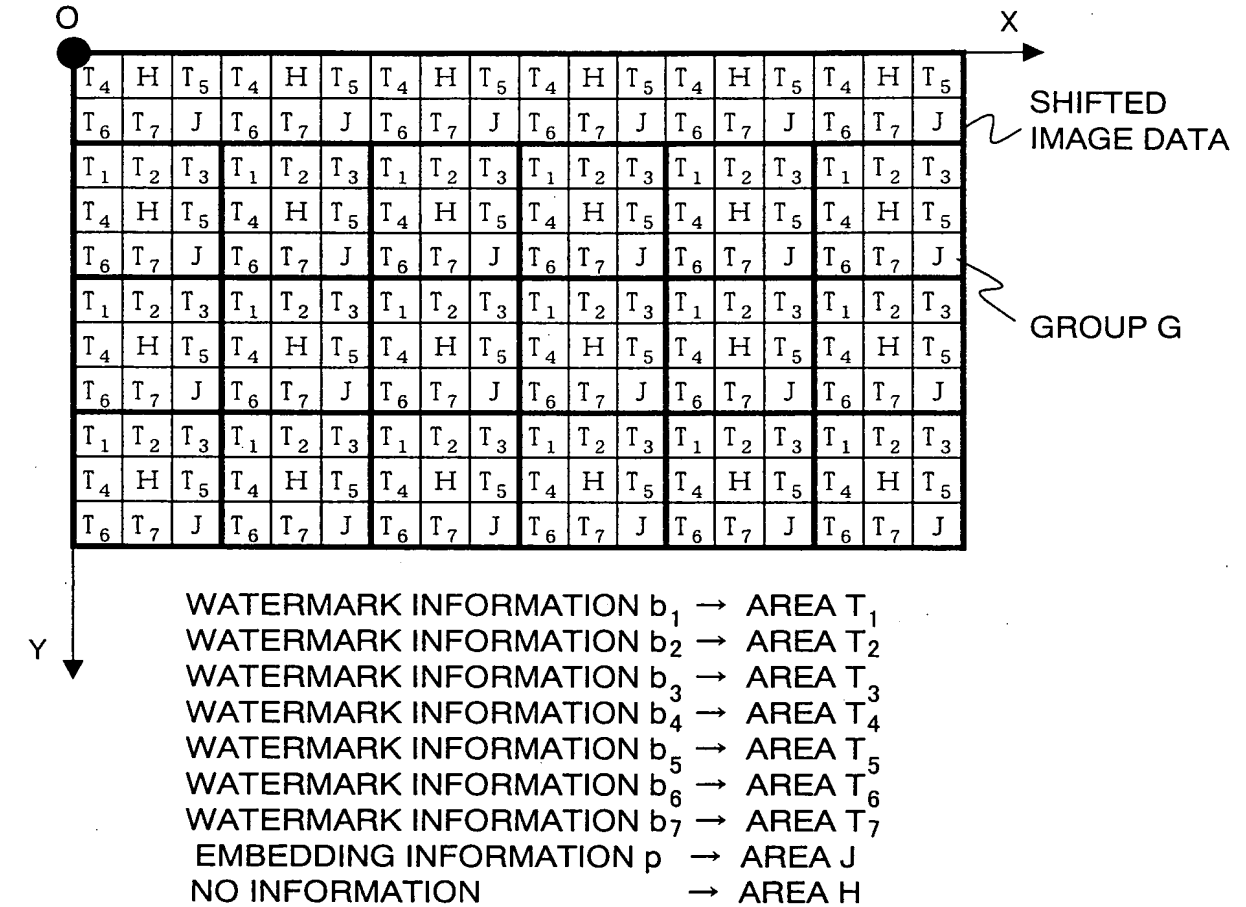


FIG.12

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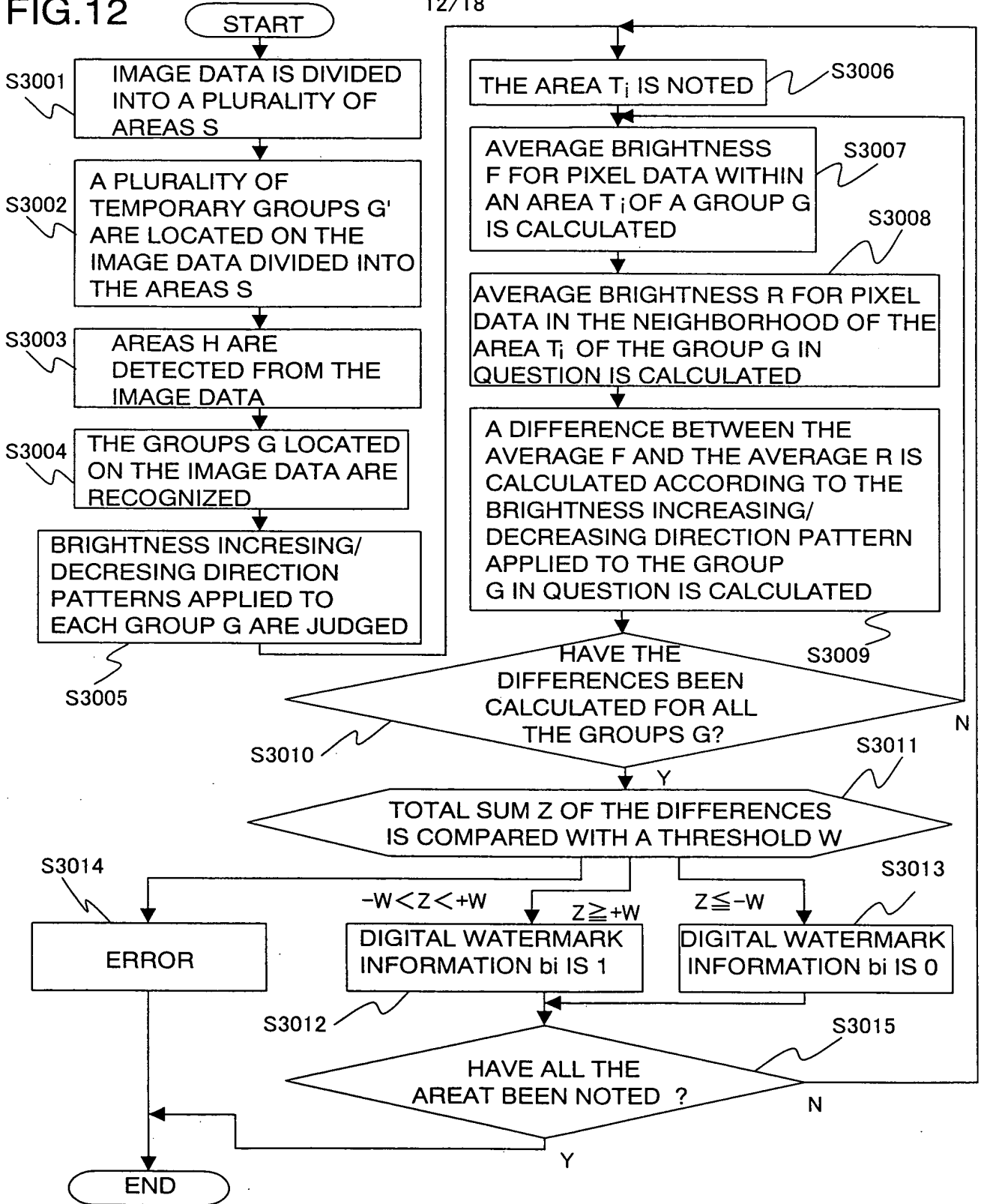


FIG.13A

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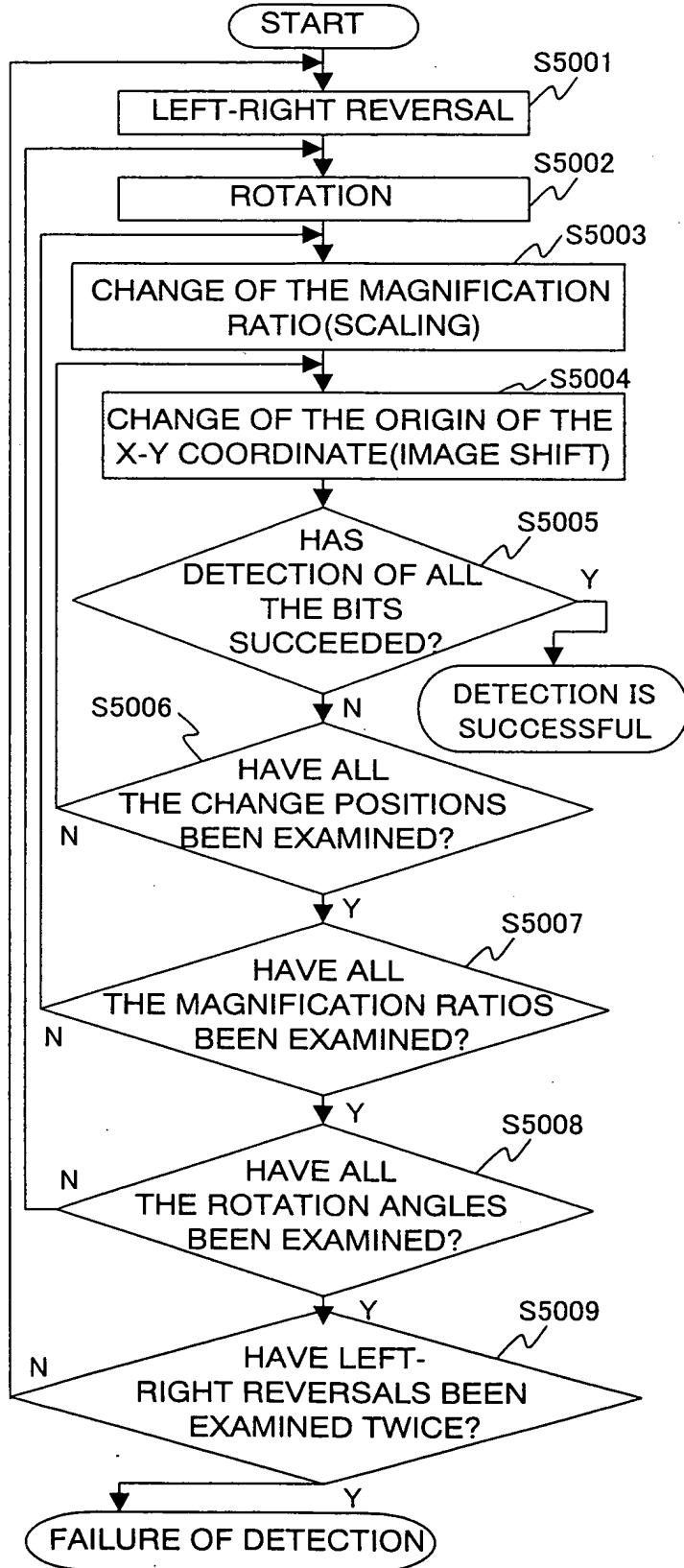


FIG.13B

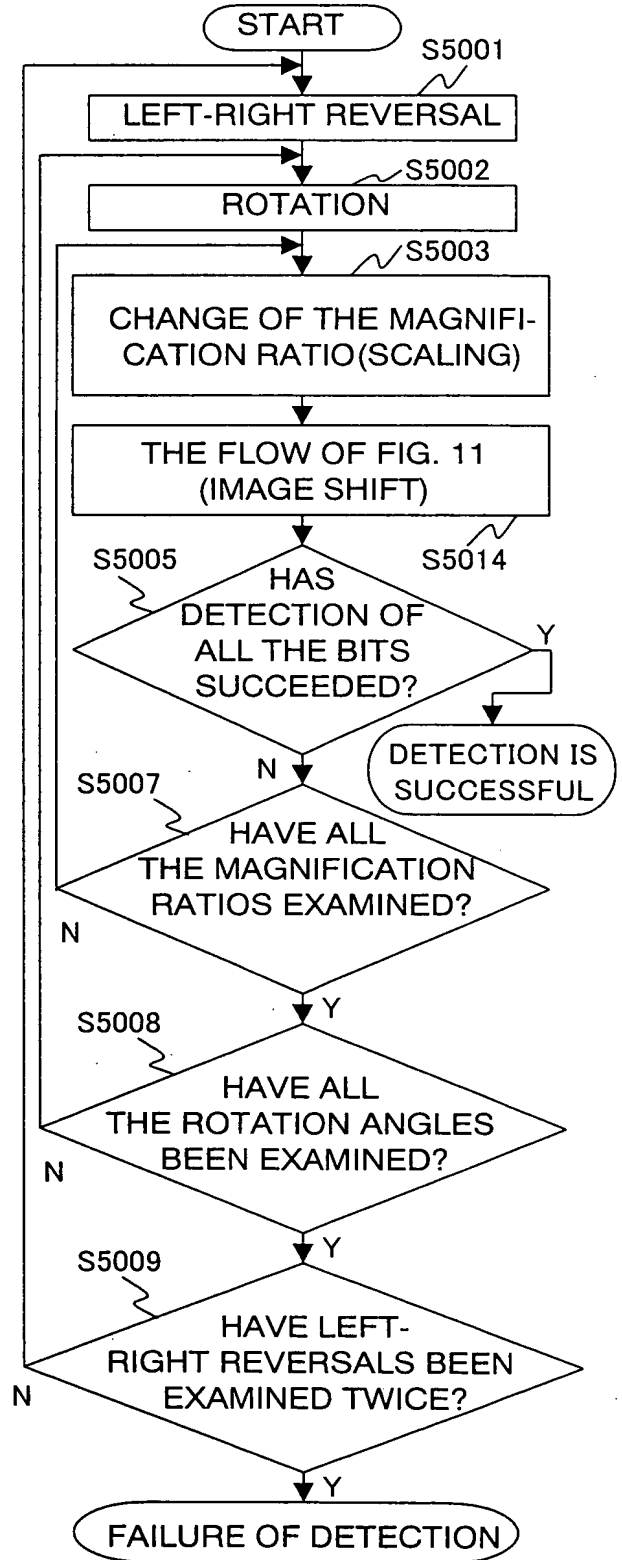


FIG.14

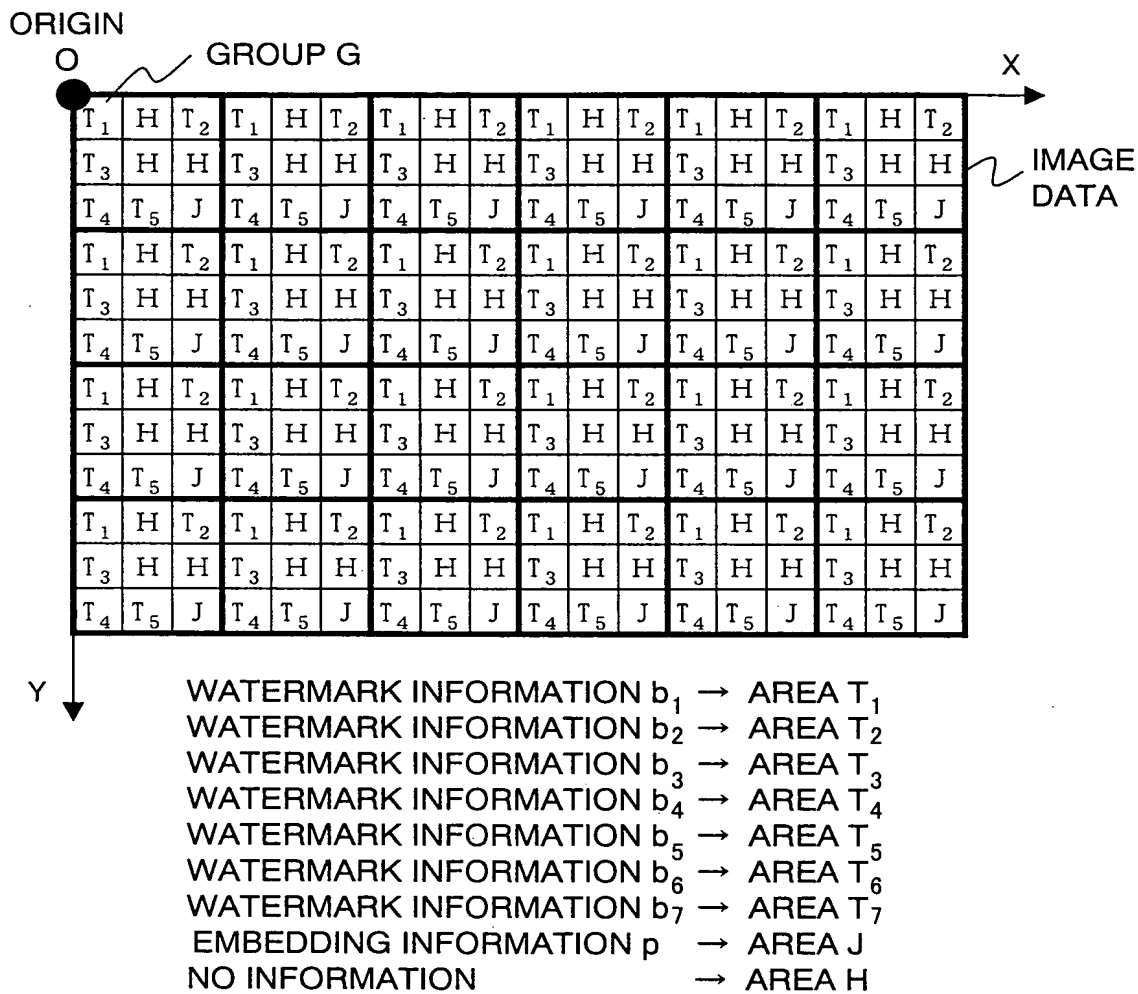


FIG.15

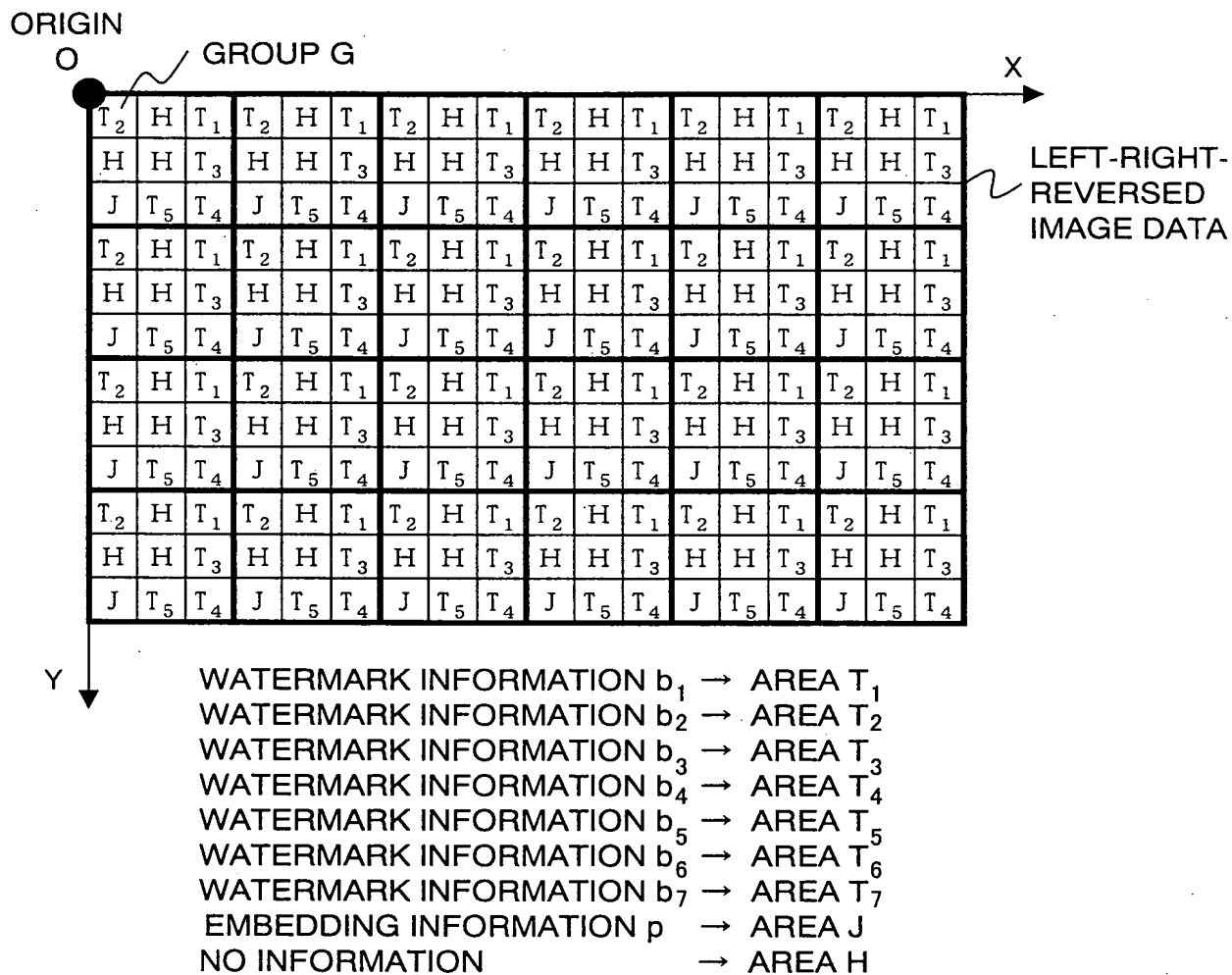


FIG.16

ORIGIN
O

GROUP G

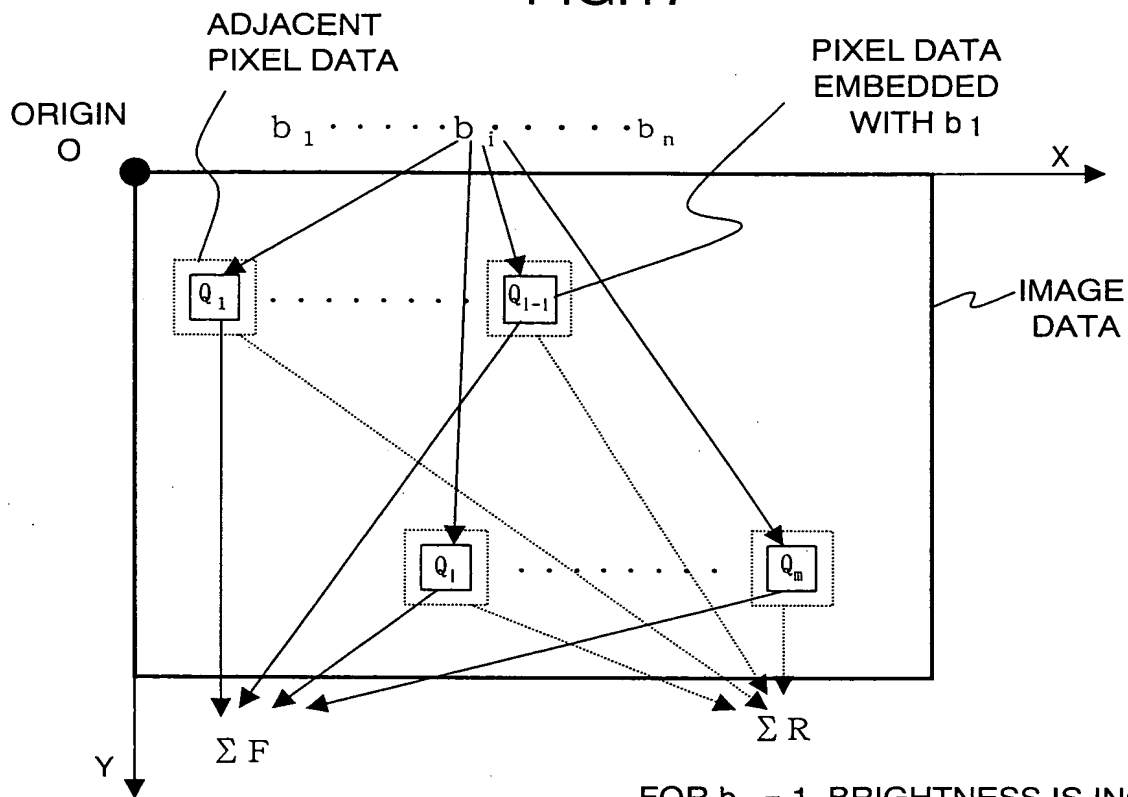
J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄
H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃
T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁
J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄
H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃
T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁
J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄
H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃
T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁
J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄
H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃
T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁
J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄	J	T ₅	T ₄
H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃	H	H	T ₃
T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁	T ₂	H	T ₁

180-DEGREE-
ROTATED
IMAGE DATA

WATERMARK INFORMATION b_1 → AREA T₁
 WATERMARK INFORMATION b_2 → AREA T₂
 WATERMARK INFORMATION b_3 → AREA T₃
 WATERMARK INFORMATION b_4 → AREA T₄
 WATERMARK INFORMATION b_5 → AREA T₅
 WATERMARK INFORMATION b_6 → AREA T₆
 WATERMARK INFORMATION b_7 → AREA T₇
 EMBEDDING INFORMATION p → AREA J
 NO INFORMATION → AREA H

0000000000000000

FIG.17



FOR $b_i = 1$, BRIGHTNESS IS INCREASED
FOR $b_i = 0$, BRIGHTNESS IS DECREASED

JUDGEMENT : $\Sigma F - \Sigma R \geq Th \rightarrow b_i = 1$

$\Sigma F - \Sigma R \leq -Th \rightarrow b_i = 0$

$-Th < \Sigma F - \Sigma R < Th \rightarrow$ WATERMARK IS NOT EMBEDDED
(WHERE Th IS A POSITIVE THRESHOLD)

FIG.18

